MA 121 - 002

Tuesday, September 4

polynomial:

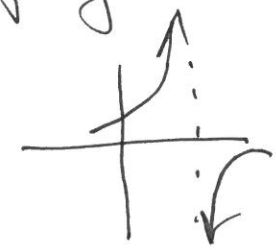
$$f(x) = a_n x^{n} + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \cdots + a_2 x^{2} + a_1 x^{1} + a_0$$

all exponents are NON-NEG. INTEGERS

{ (1) continuous
(2) "smooth"

} not smooth

not a polynom.

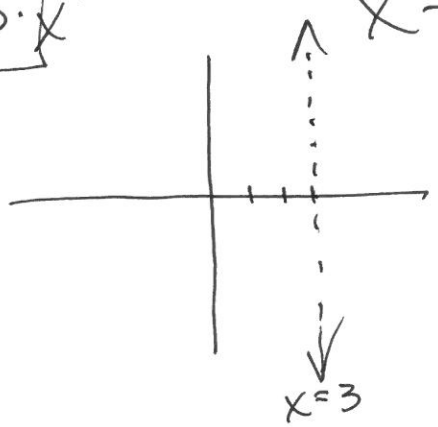


rational functions:

$$f(x) = \frac{\text{polynomial}}{\text{polynomial}}$$ } not a polynom.

$$f(x) = \frac{2x^1+1\cdot x^0}{x-3\cdot x^0} = \frac{2x+1}{x-3}$$

$x=3$ V.A.



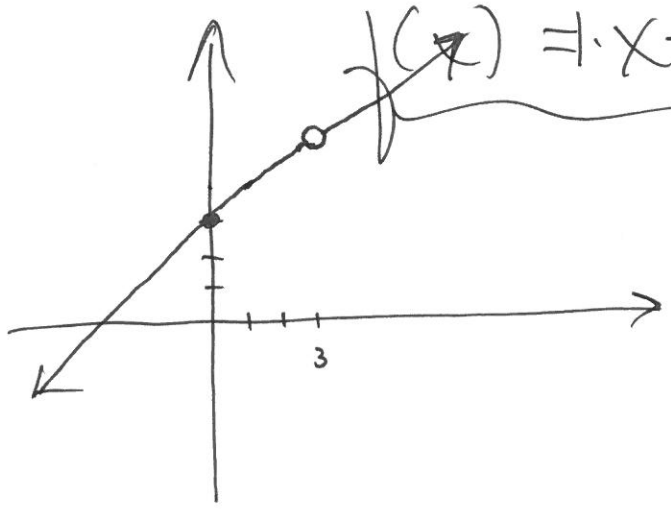
$$f(x) = \frac{x^2-9}{x-3} = \frac{(x-3)(x+3)}{(x-3)\cdot 1}$$

3.00001 3.00001

($x=3$ is not a VERT. ASYMP)

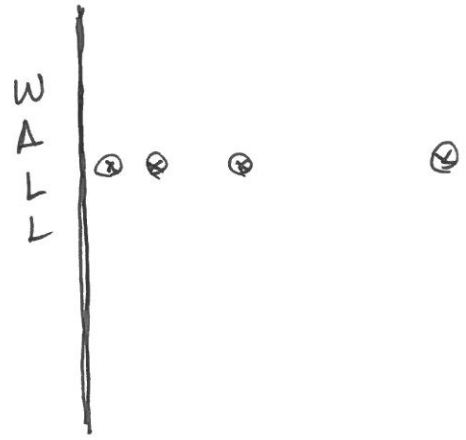
$f(x) = 1\cdot x+3$ $(x\neq 3)$

no point there



line with a "HOLE" in it

1.1: LIMITS



"move half the distance to the wall"

LIMIT = WALL

$\lim_{x \to a} f(x) = L$ (2-sided limit)

$x \to a$: x approaches a

$x \neq a$

a

one-sided limit (1) $\lim_{x \to a^+} f(x) = L$ (from the right)

one-sided limit (2) $\lim_{x \to a^-} f(x) = L$ (from the left)

$f(x) = 5x + 1$

$\lim_{x \to 2} (5x+1) = 11$

(1) $\lim_{x \to 2^+} (5x+1) = 11$ (from the right)

x	y
2.1	11.5
2.01	11.05
2.001	11.005
⋮	⋮
2	11

(2) $\lim_{x \to 2^-} (5x+1) = 11$ (from the left)

x	y
1.9	10.5
1.99	10.95
1.999	10.995
⋮	⋮
2	11

$$f(x) = \begin{cases} 3x+4, & x < 1 \\ 2x-1, & x \geq 1 \end{cases}$$

$x \to 1^+$ $\quad$ $x \to 1^-$ $\quad$ (5)

$$\lim_{x \to 1} f(x) = \text{D.N.E.}$$

(a limit does not exist)

① $\lim_{x \to 1^+} f(x) = 1$

② $\lim_{x \to 1^-} f(x) = 7$

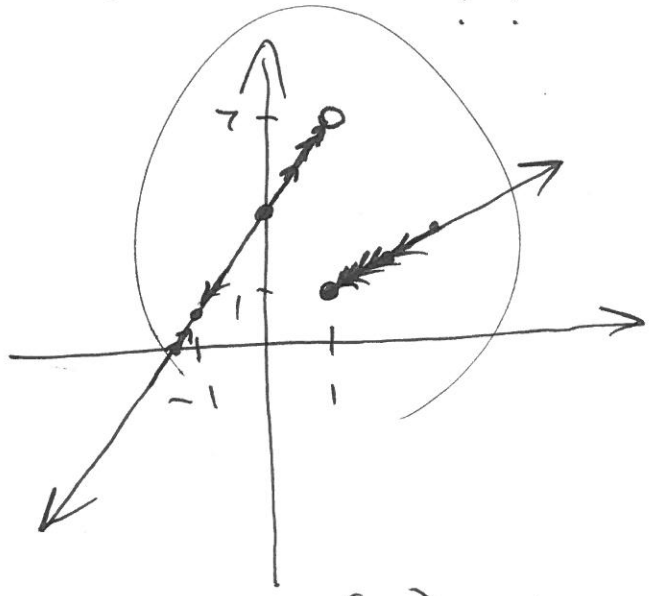
$y = 3x+4$ $(x < 1)$

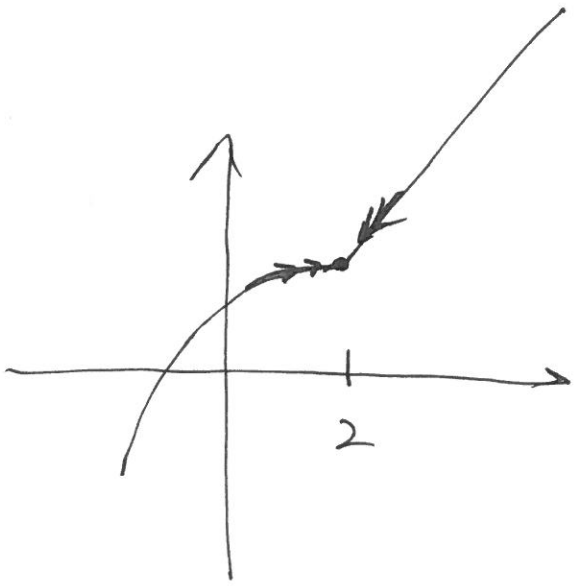
x	y
1	7
0	4
−1	1
⋮	⋮

omit

$y = 2x-1$ $(x \geq 1)$

x	y
1	1
2	3
3	5
⋮	⋮

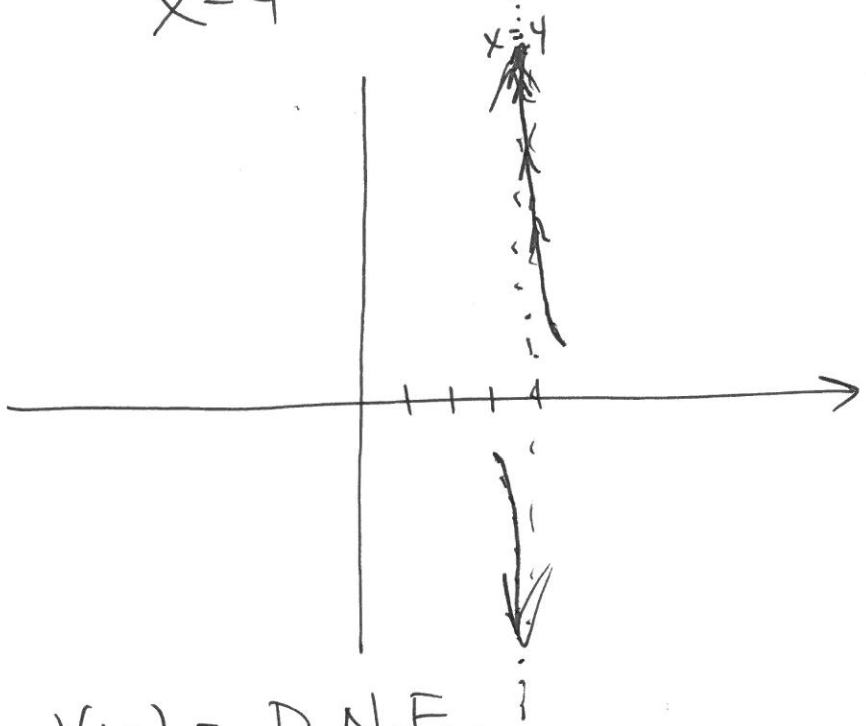




$$\lim_{x \to -1} f(x) = 1$$

$f(x) = \dfrac{1}{x-4}$

V.A: $x = 4$



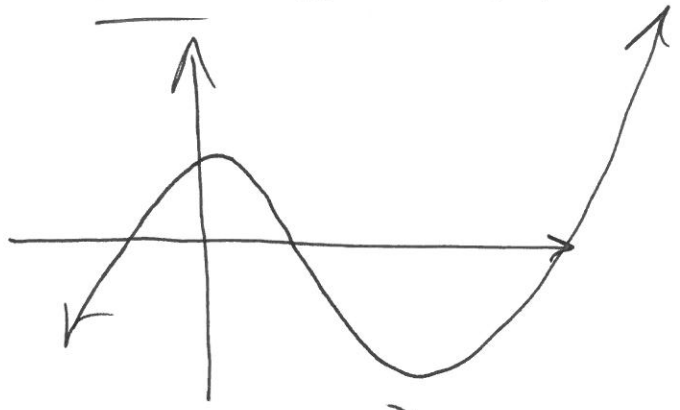
* $\lim_{x \to 4} f(x) =$ D.N.E.

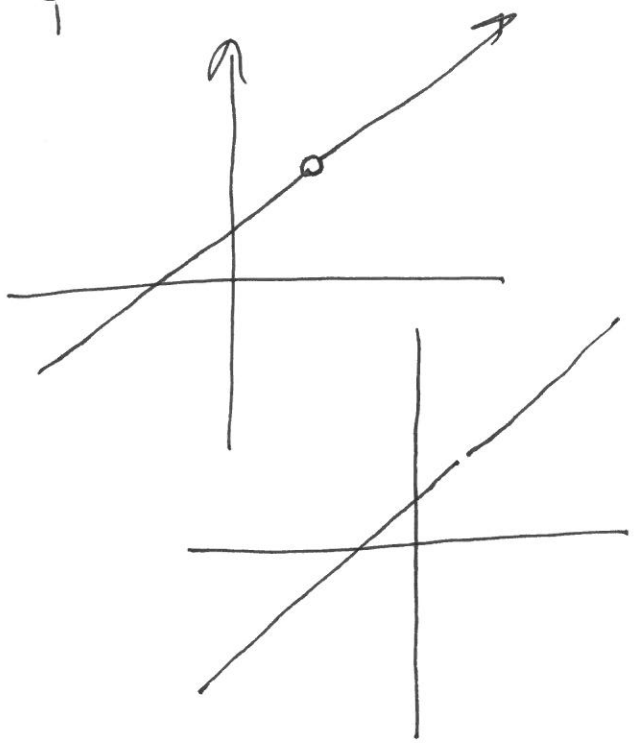
(1) $\lim_{x \to 4^+} f(x) = +\infty$ ✓

(2) $\lim_{x \to 4^-} f(x) = -\infty$ ✓

$\lim_{x \to \infty} f(x)$

1.2: CONTINUITY



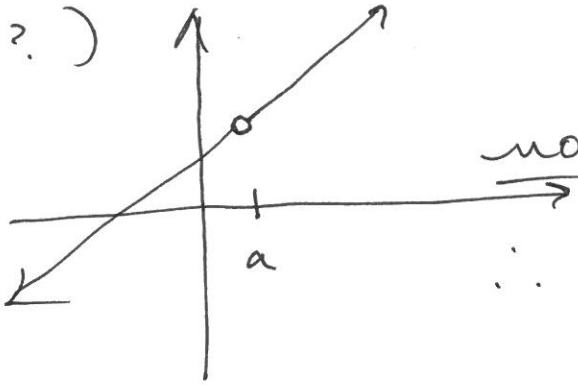


(3-part) test for continuity at $x=a$:

✓(1) $f(a)$ exists?

"is there a point plotted there"?

$(a, ?)$

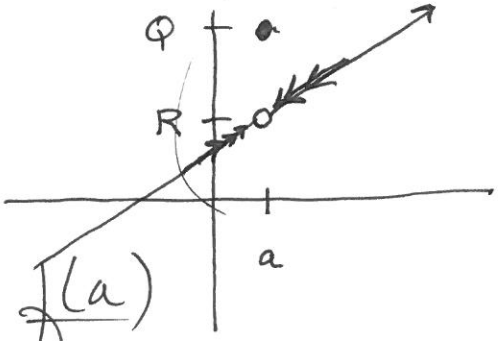


no $f(a)$ ⟹ ∴ DISCON.

✓(2) $\lim_{x \to a} f(x)$ exists?

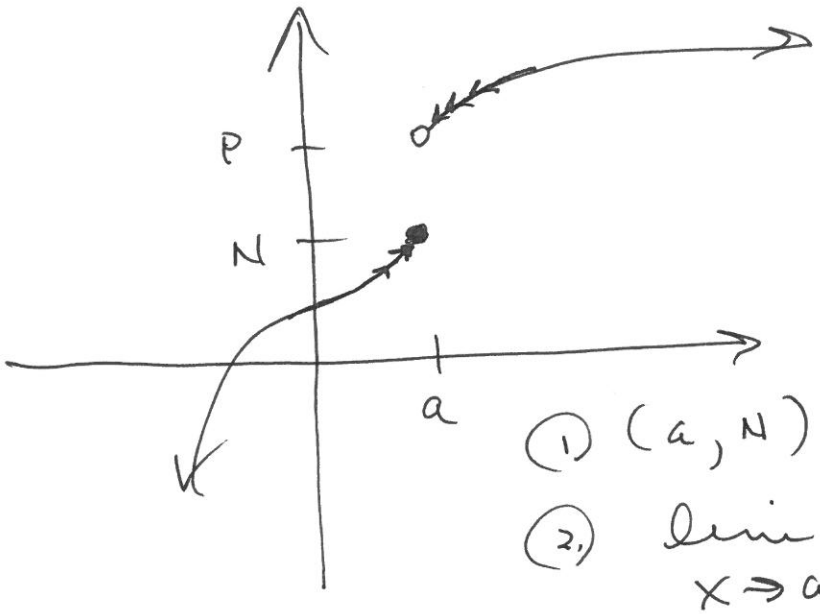
① (a, Q) ✓

② $\lim_{x \to a} f(x) = R$ ✓



✓(3) $\lim_{x \to a} f(x) \overset{?}{=} f(a)$

$R \overset{??}{=} Q$ ∴ DISCONTIN.



(1) (a, N)

(2) $\lim_{x \to a} f(x) = \text{D.N.E.}$

$\therefore$ DISCONTIN

$f(x) = x^2 + 5$

cont at $x = 4$?

(1) $f(4) = 21$

(2) $\lim_{x \to 4} (x^2+5) = 21$

(3) $\lim_{x \to 4} (x^2+5) = f(4)$

$21 = 21$ ✓

CONTIN.

121-002:

--Free drop-in tutoring for 100 and 200 level math classes is available in SAS 2105 starting Tuesday September 4.

--The tutoring hours, new this semester, are 9-5 Mondays through Thursdays and Fridays from 9-4.

--Undergraduates will now be required to **sign in** when they arrive to receive tutoring, both on the whiteboard (so tutors can keep track of who is in SAS 2105 to receive tutoring and who is there to work on their own) and on a clipboard located near the whiteboard (so I can collect data on tutoring center utilization and provide recommendations on staffing numbers for future semesters.)

--The tutor schedule, which is not yet finalized but will be by the end of the week, can be found here.

There are signs placed throughout SAS 2105 which should make the new procedures clear.

If you or your students have any questions, comments, or concerns about MMC tutoring, feel free to **contact me** at kaahrens@ncsu.edu.

121-002:

9/4	9/6	9/11	9/13
TUES	THURS	TUES:	THURS:
1.1 ; 1.2	1.3 ; 1.4	1.5 ; 1.6 ; REV.	TEST #1

121 - 002:

Subject: Tentative office hours for Ju Wang
From: Ju Wang <jwang74@ncsu.edu>
Date: 9/4/18, 11:58 AM
To: John R Griggs <jrgriggs@ncsu.edu>
CC: Alexander Mendez <amendez6@ncsu.edu>, pmisra@ncsu.edu

Hi Dr. Griggs,

I have planned to hold the office hours on 3-4pm on Mondays at SAS hall 4117. Please let me know if there is any problem or might be changed for better accommodation.

Thanks,
Ju Wang

121-002:

Subject: Re: Office hours
From: Pratik Misra <pmisra@ncsu.edu>
Date: 9/4/18, 12:13 PM
To: John Griggs <jrgriggs@ncsu.edu>

I just realized that time might not be suitable for me. So I was thinking to have it on Wednesdays 3-4pm in SAS 4125. Sorry for the confusion.

On Tue, Sep 4, 2018 at 12:06 PM Pratik Misra <pmisra@ncsu.edu> wrote:

> Hi Dr Griggs,
> I was planning to have my office hour from 2-3pm on Tuesdays. Please let me know if there is any problem with this time.
>
> Thanks,
> Pratik

121-002:

The Alma Mater of NC State

Where the winds of Dixie softly blow o'er the fields of Caroline,
There stands ever cherished, N.C. State, as thy honored shrine
So lift your voices! Loudly sing from hill to oceanside!
Our hearts ever hold you, N.C. State in the folds of our love and pride

Words by Alvin Fountain : Class of '22
Music by Bonnie Norris: Class of '23